



Complete Summary

GUIDELINE TITLE

ACR Appropriateness Criteria® acute respiratory illness.

BIBLIOGRAPHIC SOURCE(S)

Washington L, Khan A, Mohammed TL, Batra PV, Gurney JW, Haramati LB, Jeudy J, MacMahon H, Rozenshtein A, Vydareny KH, Kaiser L, Raoof S, Expert Panel on Thoracic Imaging. ACR Appropriateness Criteria® acute respiratory illness. [online publication]. Reston (VA): American College of Radiology (ACR); 2008. 7 p. [27 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Haramati LB, Davis SD, Goodman PC, Khan A, Leung AN, McCloud TC, Rosado de Christenson ML, Rozenshtein A, White CS, Kaiser LR, Expert Panel on Thoracic Imaging. Acute respiratory illness. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 6 p.

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

COMPLETE SUMMARY CONTENT

SCOPE
METHODOLOGY - including Rating Scheme and Cost Analysis
RECOMMENDATIONS
EVIDENCE SUPPORTING THE RECOMMENDATIONS
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS
QUALIFYING STATEMENTS
IMPLEMENTATION OF THE GUIDELINE
INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT
CATEGORIES
IDENTIFYING INFORMATION AND AVAILABILITY
DISCLAIMER

SCOPE

DISEASE/CONDITION(S)

Acute respiratory illness, including pneumonia, pneumothorax, inhalational anthrax, and severe acute respiratory syndrome (SARS)

GUIDELINE CATEGORY

Diagnosis
Evaluation

CLINICAL SPECIALTY

Family Practice
Internal Medicine
Pulmonary Medicine
Radiology

INTENDED USERS

Health Plans
Hospitals
Managed Care Organizations
Physicians
Utilization Management

GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of initial radiologic examinations for patients with acute respiratory illness

TARGET POPULATION

Patients with acute respiratory illness

INTERVENTIONS AND PRACTICES CONSIDERED

1. X-ray, chest
2. Computed tomography (CT), chest, without and with contrast

MAJOR OUTCOMES CONSIDERED

Utility of radiologic procedures in diagnosis and evaluation of acute respiratory illness

METHODOLOGY**METHODS USED TO COLLECT/SELECT EVIDENCE**

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guideline developer performed literature searches of peer-reviewed medical journals, and the major applicable articles were identified and collected.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not stated

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

One or two topic leaders within a panel assume the responsibility of developing an evidence table for each clinical condition, based on analysis of the current literature. These tables serve as a basis for developing a narrative specific to each clinical condition.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed for reaching agreement in the formulation of the appropriateness criteria. The American College of Radiology (ACR) Appropriateness Criteria panels use a modified Delphi technique to arrive at consensus. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are distributed to the participants along with the evidence table and narrative as developed by the topic leader(s). Questionnaires are completed by participants in their own professional setting without influence of the other members. Voting is conducted using a scoring system from 1-9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty percent agreement is considered a consensus. This modified Delphi technique enables individual, unbiased expression, is economical, easy to understand, and relatively simple to conduct.

If consensus cannot be reached by the Delphi technique, the panel is convened and group consensus techniques are utilized. The strengths and weaknesses of each test or procedure are discussed and consensus reached whenever possible.

If "No consensus" appears in the rating column, reasons for this decision are added to the comment sections.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

ACR Appropriateness Criteria®

Clinical Condition: Acute Respiratory Illness

Variant 1: Older than age 40.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	8		Min
CT chest without contrast	4		Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 2: Dementia, any age.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	8		Min
CT chest without contrast	4		Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 3: Younger than 40 years old, negative physical exam, and no other signs, symptoms, or risk factors.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	4		Min
CT chest without contrast	1		Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 4: Less than 40 years old, positive physical exam, or other risk factors.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		Min
CT chest without contrast	4		Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 5: Complicated pneumonia.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		Min
CT chest with or without contrast	8	If pneumonia is not resolving or intervention is contemplated.	Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 6: Suspected SARS.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		Min
CT chest without contrast	9	If chest radiograph is normal or equivocal.	Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 7: Suspected anthrax.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		Min
CT chest with or without contrast	8	If chest radiograph is normal or equivocal.	Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 8: Febrile, neutropenic.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		Min
CT chest with or without contrast	8	If chest radiograph is normal or equivocal.	Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 9: Acute asthma uncomplicated.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	4		Min
CT chest without contrast	1		Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 10: Acute asthma, suspected pneumonia, pneumothorax.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		Min
CT chest without contrast	2		Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 11: Acute exacerbation of COPD, "uncomplicated" (no history of CAD or CHF, no leukocytosis, fever, or chest pain).

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	4		Min
CT chest without contrast	2		Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 12: Acute exacerbation of COPD with one or more of the following: leukocytosis, pain, history of CAD or CHF.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		Min
CT chest without contrast	4		Med
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Summary of Literature Review

Acute respiratory illness (ARI) is defined as one or more of the following: cough, sputum production, chest pain, or dyspnea, (with or without fever). The work-up of a patient with ARI, including the need for chest radiography and computed tomography (CT), depends on many factors, including severity of the illness; age of patient; presence of fever, leukocytosis or hypoxemia; clinical history; presence of other risk factors; and physical examination. Not all studies concur as to which patients with ARI should have chest radiographs.

In a study of 1,102 outpatients with ARI, the researchers found patient age, the physical examination, and the presence or absence of hemoptysis to be important factors. Only 4% (7/175) of patients younger than age 40 with symptoms of ARI, a negative physical examination, and no hemoptysis had acute significant radiographic findings, whereas patients either older than age 40 with hemoptysis

or with a positive physical examination had a much higher incidence of chest radiograph abnormalities. In a study of 464 patients with ARI, the authors also found a low incidence (3%) of pneumonia in patients with negative physical examinations. A notable exception was found for patients with dementia, in whom the incidence of pneumonia was very high regardless of the results of the physical examination. Another group of researchers studied 79 outpatients presenting with clinical suspicion of pneumonia and concluded that radiographs should be ordered only when patients present with fever, cough, sputum production, and coarse crackles on physical examination. Conversely, in a study of 221 patients with ARI, researchers found that 77 (35%) had new clinically important findings. Furthermore, the clinical findings did not differ significantly between those with positive radiographic findings and those with negative findings (i.e., clinical history and physical examination were poor predictors of radiography-detected abnormality). A study that evaluated 192 patients with a clinical suspicion of pneumonia by general practitioners, found that the probability of pneumonia was changed by chest radiographic results in 53% of patients, with a decrease in probability in 47% and an increase in probability in 6%.

In a series of 300 patients with acute cough illness, it was found that for patients with a high pretest probability of pneumonia, a radiograph was not always obtained in clinical practice; they infer that when the clinical probability of pneumonia exceeds a certain level, a negative radiograph would not alter treatment decisions by clinicians. A series that included 2,706 patients hospitalized with community-acquired pneumonia similarly showed that 911 (one-third) of patients had radiographs initially interpreted as negative for pneumonia, with minimal change in this interpretation on retrospective review of a random subgroup. The groups with positive and negative radiographs had similar rates of positive sputum cultures and blood cultures. These two studies call into question the utility of radiographs in patients with high pretest probability of pneumonia.

Patients with substance abuse have an increased risk of ARI due to two mechanisms: respiratory pump failure and pulmonary pathology. Respiratory pump failure generally does not have radiographic manifestations. However, pulmonary pathology includes multiple diagnosis with chest radiographic manifestations, including aspiration, pulmonary edema, pneumonia, hemorrhage, and septic emboli.

One study found a low incidence (4%) of pneumonia in febrile, but otherwise asymptomatic, neutropenic patients with a normal physical examination. Another study found a similarly low incidence (2.3%) of pneumonia at chest radiography in febrile neutropenic patients without clinical suspicion of pneumonia from history or physical examination. A group of researchers evaluated the utility of thin-section CT in a group of febrile neutropenic patients with normal or nonspecific chest radiographs. There were 146 episodes in 87 patients. Among the 14% with nonspecific chest radiographs, CT suggested pneumonia in all. Forty-eight percent had a normal chest radiograph, but CT findings of pneumonia. Of these, a specific pathogen was identified in 43%. Both chest radiograph and CT findings were normal in 38%. The CT findings changed patient's therapy in 18%. Another group of researchers have proposed an algorithm employing CT in conjunction with galactomannan assays to select patients for high-dose antifungal therapy and performed a feasibility study assessing patients with 117 episodes of neutropenic fever. When the algorithm employing CT was used, only 4.4% of patients received

antifungal therapy. Another study retrospectively analyzed CT scans and autopsy results in 96 cancer patients who died of pneumonia and found that the presence of nodules in neutropenic patients and cavitary lesions in non-neutropenic patients was highly associated with fungal infection.

According to the guidelines of the Infectious Disease Society of America and the American Thoracic Society, chest radiography should be obtained whenever pneumonia is suspected in adults to establish the diagnosis and to aid in differentiating community-acquired pneumonia (CAP) from other common causes of cough and fever, such as acute bronchitis. Findings on chest radiographs are one of several parameters used to determine: (1) which patients should be hospitalized (presence of pleural effusion); (2) which patients should be classified as severe pneumonia (multilobar involvement); and (3) which patients may require additional diagnostic testing (cavitation, pleural effusion), including thoracentesis (pleural effusions >5 cm on lateral upright radiograph). CT may show findings in patients with normal radiographs, but the significance of these findings and therefore the utility of CT in patients with clinically suspected pneumonia and negative radiographs are unclear. CT may play a role in the management of severe pneumonia. It can serve as a guide for pleural drainage or localize an appropriate site for biopsy. Severe pneumonias bear a strong relationship to etiologic pathogens and have implications for antimicrobial treatment. Patients with severe pneumonia should be considered as candidates for admission to an intensive care unit.

The need for chest radiographs in adult patients with acute asthma is controversial. One group of researchers found clinically important (i.e., patient management affected) radiographic findings in 9% of their patients and concluded that chest radiography is indicated. However, another study observed that 99% of their patients either had normal chest radiographic examinations or showed only slightly prominent markings or hyperinflation. Another researcher reported that patients with acute asthma rarely have pneumonia. One study recommended chest radiographs only when pneumonia or pneumothorax is suspected. But another study found significant chest radiographic abnormalities in 34% of adults whose asthma exacerbation warranted admission to the hospital.

One research team studied the utility of chest radiography in 242 patients with acute exacerbations of chronic obstructive pulmonary disease (COPD) (i.e., dyspnea). Of this group, 135 patients (56%) had asthma, and 107 (44%) had emphysema and chronic bronchitis. Chest radiographs were abnormal in 14% but resulted in significant change in management in only 4.5%. They concluded that the chest radiograph is indicated only if the worsening dyspnea is accompanied by leukocytosis, chest pain, or edema or by a history of coronary artery disease or congestive heart failure (CHF).

Emerging infections and biological warfare agents have come to recent attention as causes of ARI. Two infections that received a great deal of attention recently, but which have subsequently become less active concerns, are severe acute respiratory syndrome (SARS) and anthrax.

SARS emerged in China in late 2002. The etiologic agent is a novel coronavirus (SARS-CoV) that appears to have originated in Himalayan palm civets and crossed the species barrier. In February 2003 the Program for Monitoring Emerging

Diseases identified this novel presentation of pneumonia which because of air travel, rapidly spread across continents to involve patients in at least 27 countries. There is literature supporting the utility of chest radiography in patients with known or suspected SARS. Two separate studies described the chest radiographic findings of SARS during the Hong Kong and Toronto epidemics. Chest radiographs were abnormal in 78% to 80% of patients at presentation. The most common chest radiographic finding was unifocal opacity with a peripheral and basilar predominance. Multifocal or diffuse opacities could be present initially or develop as the disease progressed. Patients whose disease progressed were generally older, had more comorbidities, and had a higher fatality rate. Cavitation, pleural effusion, and lymphadenopathy were not features of SARS. A study of 1,373 patients in Hong Kong with SARS found a sensitivity for disease of 82.4% on initial chest radiographs; they also concluded that the initial extent of radiographic opacification had prognostic value and that the rate of radiographic progression could be used as a prognostic indicator.

Thin section chest CT findings of SARS have been described by three different studies. The most common findings are ground glass opacities and crazy paving. More extensive findings include focal or multifocal consolidation. One group of researchers described pleural effusions and pneumomediastinum developing in 26% of patients scanned during the course of their illness. Another group suggested that high-resolution computed tomography (HRCT) is useful for early diagnosis of SARS in patients with negative chest radiographs. They studied 47 patients with suspected SARS and normal chest radiographs; 25 of 27 patients with serologic confirmation of SARS had abnormal findings at HRCT and developed clinical SARS, while the two with negative HRCTs did not develop pulmonary infection.

Anthrax is endemic in the soil of Texas, Oklahoma, and the Mississippi Valley. During the 20th century a number of countries developed weapon-grade anthrax to be used as a biological warfare agent. Much of modern medical experience with it arises from a Soviet military accident in 1979 in which 42 people died of anthrax, and from cases of anthrax that developed in the U.S. in 2001 as a result of biological warfare. Anthrax comes in three forms: cutaneous, gastrointestinal, and inhalational. Ninety-five percent of anthrax is cutaneous, but the inhalational form is the most deadly. Inhalation of anthrax spores leads to hemorrhagic lymphadenitis and mediastinitis, sometimes accompanied by necrotizing pneumonia. The chest radiographic findings include widened mediastinum and hila, often accompanied by pleural effusions and parenchymal opacities. One study described the CT findings in two patients who survived inhalational anthrax. The CT characteristics were very suggestive of the diagnosis and included hyperattenuating hilar and mediastinal lymphadenopathy and hemorrhagic pleural effusion. Less specific findings included mediastinal edema, peribronchial thickening, and pleural effusion.

Summary

Based on these studies, the chest radiograph seems warranted in ARI when one or more of the following are present: older than age 40; dementia; a positive physical examination; hemoptysis; associated abnormalities (leukocytosis, hypoxemia); or other risk factors, including coronary artery disease, CHF, or drug-induced acute respiratory failure. Chest radiography also seems warranted

for any adult patient with clinical suspicion of pneumonia, although some clinicians may choose not to perform radiography if clinical suspicion of respiratory infection is sufficiently high to warrant treatment if a radiograph were to be negative. It appears that in patients with ARI, who are younger than age 40, chest radiography is not routinely indicated unless there are other abnormalities, a positive physical examination, or other risk factors. It also appears that chest radiographic examination is not indicated in most patients with exacerbations of COPD (including asthma) unless there is a suspected complication such as pneumonia or pneumothorax or unless one or more of the following are present: leukocytosis, chest pain, edema, or a history of coronary artery disease or CHF. Chest CT may be warranted in complicated cases of severe pneumonia and in febrile neutropenic patients with normal or nonspecific chest radiographic findings. In patients with a normal chest radiograph and a high clinical suspicion of SARS, CT can be helpful in making the diagnosis.

Abbreviations

- CAD, coronary artery disease
- CHF, congestive heart failure
- COPD, chronic obstructive pulmonary disease
- CT, computed tomography
- Med, medium
- Min, minimal
- SARS, severe acute respiratory syndrome

Relative Radiation Level	Effective Dose Estimated Range
None	0
Minimal	<0.1 mSv
Low	0.1-1 mSv
Medium	1-10 mSv
High	10-100 mSv

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on analysis of the current literature and expert panel consensus.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Selection of appropriate radiologic imaging procedures for evaluation of patients with severe respiratory illness

POTENTIAL HARMS

Relative Radiation Level (RRL)

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Additional information regarding radiation dose assessment for imaging examinations can be found in the American College of Radiology (ACR) Appropriateness Criteria® Radiation Dose Assessment Introduction document (see "Availability of Companion Documents" field).

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Personal Digital Assistant (PDA) Downloads

For information about [availability](#), see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Washington L, Khan A, Mohammed TL, Batra PV, Gurney JW, Haramati LB, Jeudy J, MacMahon H, Rozenshtein A, Vydareny KH, Kaiser L, Raoof S, Expert Panel on Thoracic Imaging. ACR Appropriateness Criteria® acute respiratory illness. [online publication]. Reston (VA): American College of Radiology (ACR); 2008. 7 p. [27 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1995 (revised 2008)

GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

SOURCE(S) OF FUNDING

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

GUIDELINE COMMITTEE

Committee on Appropriateness Criteria, Expert Panel on Thoracic Imaging

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Panel Members: Lacey Washington, MD; Arfa Khan, MD; Tan-Lucien Mohammed, MD; Poonam V. Batra, MD; Jud W. Gurney, MD; Linda B. Haramati, MD; Jean Jeudy, MD; Heber MacMahon, MD; Anna Rozenshtein, MD; Kay H. Vydareny, MD; Larry Kaiser, MD; Suhail Raoof, MBBS

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

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The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [American College of Radiology \(ACR\) Web site](#).

ACR Appropriateness Criteria® *Anytime, Anywhere*™ (PDA application). Available from the [ACR Web site](#).

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- ACR Appropriateness Criteria®. Background and development. Reston (VA): American College of Radiology; 2 p. Electronic copies: Available in Portable Document Format (PDF) from the [American College of Radiology \(ACR\) Web site](#).
- ACR Appropriateness Criteria® radiation dose assessment introduction. American College of Radiology. 2 p. Electronic copies: Available from the [American College of Radiology Web site](#).

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on April 3, 2006. This NGC summary was updated by ECRI Institute on July 22, 2009.

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